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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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CHRISTIE, PARKER & HALE, LLP  
PO BOX 7068  
PASADENA, CA 91109-7068

EXAMINER
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HO, ALLEN C

ART UNIT	PAPER NUMBER
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2882

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/807,916	<b>Applicant(s)</b> CHI ET AL.	
	<b>Examiner</b> Allen C. Ho	<b>Art Unit</b> 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 May 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 and 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-13,15-19 and 21 is/are rejected.
- 7) ☒ Claim(s) 2,5 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Objections*

1. Claim 19 is objected to because of the following informalities:

Line 3, "or" should be replaced by --and--.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 8, 17-19 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites "a minimal size of 20 - 100  $\mu\text{m}$ ". This recitation is indefinite since it fails to set forth clearly what is the minimal size. A comparison cannot be made with a range of values.

Claims 17-19 and 21 are indefinite since it is unclear what is being claimed. The preamble recites "a grid plate comprising:", however, the body of the claims recites structures (*e.g.*, first substrate, non-pixel region) that are not part of the grid plate. Furthermore, claim 17 recites "a predetermined external voltage is applied to the grid plate". It is unclear whether or not this recitation limits the structure of the grid plate, *i.e.*, does the grid plate have a different structure when an external voltage is applied?

Art Unit: 2882

4. Claims 17-24 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: voltage source.

Claim 17 recites "wherein a predetermined external voltage is applied to the grid plate". However, claim 17 does not claim a voltage source to apply the external voltage. An external voltage does not qualify as a structural element.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 3, 4, 6, 7, 9, 10, 11, and 15-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Fushimi *et al.* (U. S. Patent No. 5,936,343).

With regard to claim 1, Fushimi *et al.* disclosed a field emission display, comprising: a first substrate (101) and a second substrate (112) facing one another and having a predetermined gap therebetween; an electron emission assembly (102) formed on the first substrate for emitting electrons; an illumination assembly (111) formed on the second substrate for displaying images responsive to electrons emitted from the electron emission assembly; and a grid plate (105) mounted between the first substrate and the second substrate, and configured to focus the

Art Unit: 2882

electrons emitted from the electron emission assembly, wherein the grid plate includes a mask section having a plurality of apertures (202) for passing the electrons and having supports (103, 104) mounted to one side of the mask section from the first substrate, and wherein the mask section has a predetermined mask section thickness ( $T_c$ ) and the supports have a predetermined support height ( $h$ ), the predetermined support height being greater than the predetermined mask section thickness (column 22, lines 21-36).

With regard to claims 3, 6, and 7, Fushimi *et al.* disclosed the field emission display of claim 1, wherein the mask section is formed of metal material (column 10, lines 34-43) and the supports are formed of an insulation material (column 12, lines 22-47).

With regard to claim 4, Fushimi *et al.* disclosed the field emission display of claim 1, wherein the supports are formed between a predetermined array of the apertures formed in the mask assembly, the supports being formed in at least one of along a direction substantially identical to a direction of the array of the apertures, and along a direction substantially perpendicular to the direction of the array of the apertures (Fig. 4A).

With regard to claim 9, Fushimi *et al.* disclosed the field emission display of claim 1, wherein a sectional aspect ratio of each of the aperture formed in the mask section is 5:1 - 1:1 (column 13, lines 28-30).

With regard to claim 10, Fushimi *et al.* disclosed the field emission display of claim 1, wherein the electron emission assembly comprises electron emission sources (102) and electrodes for causing the emission of electrons from the electron emission sources, wherein the electrodes include cathode electrodes (403) and gate electrodes (404) formed in a stripe pattern (Fig. 4A), and wherein the cathode electrodes and the gate electrodes are substantially

Art Unit: 2882

perpendicular to one another and insulated from one another by an insulation layer (column 19, lines 22-25).

With regard to claim 11, Fushimi *et al.* disclosed the field emission display of claim 10, wherein the electron emission sources are made of a carbon-based material (column 20, lines 39-41).

With regard to claim 15, Fushimi *et al.* disclosed the field emission display of claim 10, wherein the supports are mounted on the insulation layer (column 19, lines 22-25).

With regard to claim 16, Fushimi *et al.* disclosed the field emission display of claim 1, further comprising: an auxiliary insulation layer formed on an upper most layer of the first substrate (column 19, lines 22-25), and the supports are mounted on the auxiliary layer.

With regard to claims 17 and 18, Fushimi *et al.* disclosed a grid plate, comprising: a mask section (105) having a predetermined mask section thickness ( $T_c$ ) and having a plurality of apertures (202) through the predetermined mask section thickness in a predetermined pattern; and a plurality of support (103, 104) having a predetermined support height ( $h$ ), wherein a predetermined external voltage (114) is applied to the grid plate, and wherein the predetermined support height is greater than the predetermined mask section thickness (column 22, lines 21-36).

Note: The claims are interpreted by the examiner to claim the structure of a grid plate.

Consequently, structures that are not part of the grid plate are not given patentable weight.

With regard to claim 19, Fushimi *et al.* disclosed the grid plate of claim 17, wherein material forming the mask section and the supports are selected from the group consisting of: the same conducting material for both the mask section and the supports, and a conducting material

Art Unit: 2882

(column 10, lines 34-43) for the mask section and an insulating material (column 12, lines 22-47) for the supports.

7. Claims 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, and 17-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Takenaka *et al.* (U. S. Patent No. 6,583,549 B2).

With regard to claim 1, Takenaka *et al.* disclosed a field emission display, comprising: a first substrate (10) and a second substrate (12) facing one another and having a predetermined gap therebetween; an electron emission assembly (18) formed on the first substrate for emitting electrons; an illumination assembly (16) formed on the second substrate for displaying images responsive to electrons emitted from the electron emission assembly; and a grid plate (24) mounted between the first substrate and the second substrate, and configured to focus the electrons emitted from the electron emission assembly, wherein the grid plate includes a mask section having a plurality of apertures (26) for passing the electrons and having supports (30b) mounted to one side of the mask section from the first substrate, and wherein the mask section has a predetermined mask section thickness (column 10, lines 4-11) and the supports have a predetermined support height (column 10, lines 32-42), the predetermined support height being greater than the predetermined mask section thickness (column 22, lines 21-36).

With regard to claims 3, 6, and 7, Takenaka *et al.* disclosed the field emission display of claim 1, wherein the mask section is formed of metal material (column 10, lines 4-11) and the supports are formed of an insulation material (column 12, lines 1-3).

With regard to claim 4, Takenaka *et al.* disclosed the field emission display of claim 1, wherein the supports are formed between a predetermined array of the apertures formed in the mask assembly, the supports being formed in at least one of along a direction substantially

identical to a direction of the array of the apertures, and along a direction substantially perpendicular to the direction of the array of the apertures (Fig. 2).

With regard to claim 9, Takenaka *et al.* disclosed the field emission display of claim 1, wherein a sectional aspect ratio of each of the aperture formed in the mask section is 5:1 - 1:1 (column 10, lines 4-11).

With regard to claim 10, Takenaka *et al.* disclosed the field emission display of claim 1, wherein the electron emission assembly comprises electron emission sources (29) and electrodes for causing the emission of electrons from the electron emission sources, wherein the electrodes include cathode electrodes (25) and gate electrodes (23) formed in a stripe pattern (Fig. 14), and wherein the cathode electrodes and the gate electrodes are substantially perpendicular to one another and insulated from one another by an insulation layer (column 16, lines 7-13).

With regard to claim 12, Takenaka *et al.* disclosed the field emission display of claim 10, wherein the cathode electrodes are formed on the insulation layer over the gate electrodes, and the electron emission sources are mounted on the cathode electrodes (Fig. 14).

With regard to claim 13, Takenaka *et al.* disclosed the field emission display of claim 1, wherein supports taper such that a contacting area of the supports toward the mask section are larger than a contacting area of the supports toward the first substrate (column 10, lines 24-42).

With regard to claim 15, Takenaka *et al.* disclosed the field emission display of claim 1, wherein the supports are mounted on the insulation layer (Fig. 12).

With regard to claims 17 and 18, Takenaka *et al.* disclosed a grid plate, comprising: a mask section (24) having a predetermined mask section thickness (column 10, lines 4-11) and having a plurality of apertures (26) through the predetermined mask section thickness in a



predetermined pattern; and a plurality of support (30b) having a predetermined support height (column 10, lines 32-42), wherein a predetermined external voltage is applied to the grid plate (column 10, lines 52-61), and wherein the predetermined support height is greater than the predetermined mask section thickness. Note: The claims are interpreted by the examiner to claim the structure of a grid plate. Consequently, structures that are not part of the grid plate are not given patentable weight.

With regard to claim 19, Takenaka *et al.* disclosed the grid plate of claim 17, wherein material forming the mask section and the supports are selected from the group consisting of: the same conducting material for both the mask section and the supports, and a conducting material (column 10, lines 4-11) for the mask section and an insulating material (column 12, lines 1-3) for the supports.

With regard to claim 21, Takenaka *et al.* disclosed the grid plate of claim 17, wherein the supports taper such that a contacting area of the supports toward the mask section is larger than a contacting area of the supports toward the first substrate (column 10, lines 24-42).

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fushimi *et al.* (U.S. Patent No. 5,936,343) as applied to claim 1 above.

With regard to claim 8, Fushimi *et al.* disclosed the field emission display of claim 1, wherein each of the apertures formed in the mask section has a minimal size of 20-100  $\mu\text{m}$  (column 13, lines 29-30).

However, Fushimi *et al.* failed to disclose that the mask section is formed to a thickness of 20 - 100  $\mu\text{m}$ .

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the mask section having a thickness of 20 - 100  $\mu\text{m}$ , since a person would be motivated to produce a desired electron-emitting characteristic by changing various parameters according to equation (1).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takenaka *et al.* (U. S. Patent No. 6,583,549 B2) as applied to claim 10 above, and further in view of Nakamoto (U. S. Patent No. 6,097,138).

With regard to claim 11, Takenaka *et al.* disclosed the field emission display of claim 10. However, Takenaka *et al.* failed to teach that the electron emission sources are made of carbon-based material.

Nakamoto disclosed a field emission display that comprises electron emission sources made of carbon nanotubes or fullerenes. Nakamoto taught such a field emission display have uniform field emission characteristics and is capable of being driven with a low voltage (column 18, lines 10-21).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide electron emission sources made of carbon nanotubes or

Art Unit: 2882

fullerenes, since a person would be motivated to reduce power consumption and excessive heating by driving a field emission display at a low voltage.

***Allowable Subject Matter***

11. The indicated allowability of claim 20 is withdrawn in view of the newly discovered reference(s) to Fushimi *et al.* (U. S. Patent No. 5,936,343).

12. Claims 2, 5, and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

13. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Fushimi (U. S. Pub. No. 2004/0124762 A1) disclosed a field emission display that comprises a grid plate with supports.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

Art Unit: 2882

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Allen C. Ho, Ph.D.  
Primary Examiner  
Art Unit 2882

23 August 2006